

Serial No.:	10/709,699	Art Unit:	2818
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IN THE CLAIMS

Cancel claims 1-16 without prejudice to prosecution thereof in a divisional application.

Claims 1-16 (canceled)

Claim 17 (amended): A semiconductor device on a semiconductor substrate, comprising:
a wide trench and a narrow trench in the substrate;
a first electrode formed in the narrow trench composed of a first fill material of a first conductivity type;
a second electrode formed in the wide trench composed of a second fill material of an opposite conductivity type; [[and]]
a first outdiffusion region doped with dopant diffused from the first electrode into a region in the substrate about the periphery of the narrow trench; and
a second outdiffusion region doped with dopant diffused from the second electrode into a region in the substrate about the periphery of the wide trench.

Claim 18 (previously presented): The device of claim 17 wherein the semiconductor device is a photodetector.

Claim 19 (previously presented): The device of claim 17 wherein an epitaxial silicon layer is formed on trench sidewalls of the wide trench leaving a space filled with the second electrode narrowing the wide trench from a width W_{WIDE} to a width $W_{W R}$.

Claim 20 (previously presented): The device of claim 19 wherein the wide trench with the epitaxial layer formed on trench sidewalls has the same opening [[size]] width $W_{W R}$ as the narrow trench width W_{NARROW} .

Serial No.:	10/709,699	Art Unit:	2818
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Claim 21 (new): The device of claim 17 with a liner is deposited on the walls of the narrow trench and the wide trench.

Claim 22 (new): The device of claim 17 including:

- a contact to the first electrode, and
- a contact to the second electrode.

Claim 23 (new): The device of claim 17 including a pad layer formed over the substrate aside from the trenches with the pad layer comprising a layer through which light passes.

Claim 24 (new): The device of claim 17, wherein:

- the material of the first conductivity comprises N-type doped polysilicon; and
- the material of the second conductivity comprises P-type doped polysilicon.

Claim 25 (new): The device of claim 18, wherein:

- the material of the first fill material comprises N-type doped polysilicon; and
- the material of the second fill material comprises P-type doped polysilicon.

Claim 26 (new): The device of claim 17, wherein the semiconductor substrate is formed over a buried oxide layer.

Claim 27 (new): The device of claim 17, wherein the semiconductor substrate is composed of a material selected from the group consisting of Si, strained Si, $\text{Si}_{1-y}\text{C}_y$, $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$, $\text{Si}_{1-x}\text{Ge}_x$, Si alloys, Ge, Ge alloys, GaAs, InAs, InP as well as other III-V semiconductors, II-VI semiconductors, Si-containing materials, a Silicon-On-Insulator (SOI) substrates or a SiGe-On-Insulator (SGOI) substrates.

Serial No.:	10/709,699	Art Unit:	2818
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Claim 28 (new): The device of claim 17, wherein the liner material is composed of a material selected from a group consisting of silicon nitride, Ge, SiGe, WSix, TiN, Ta, Ti, and SiC.

Claim 29 (new): A photodetector device formed on a semiconductor substrate, comprising:

a wide trench and a narrow trench formed in the substrate;

a first electrode formed in the narrow trench of a deposit of a first fill material of a first conductivity type filling the wide trench partially and filling the narrow trench completely;

an epitaxial semiconductor layer formed in the wide trench leaving a narrowed wide trench therein;

a second electrode formed in the wide trench by a second fill material of an opposite conductivity type;

dopant diffused from the second electrode into a region in the substrate about the periphery of the wide trench; and

dopant diffused from the first electrode into a region in the substrate about the periphery of the narrow trench.

Claim 30 (new): The photodetector device of claim including a pad layer is formed over the substrate aside from the trenches with the pad layer comprising a layer through which light passes.

Claim 31(new): The photodetector device of claim 29, wherein

a first liner is formed on the walls of the narrow trench; and

the first fill material is deposited within the first liner inside the narrow trench.

Serial No.:	10/709,699	Art Unit:	2818
--------------------	-------------------	------------------	-------------

Claim 32 (new): The photodetector device of claim 31, wherein:

a second liner is formed on the walls of the narrowed wide trench; and
the second fill material is deposited within the second liner inside the narrowed wide trench.

Claim 33 (new): The photodetector device of claim 32, wherein the first liner and the second liner is composed of a material selected from a group consisting of silicon nitride, Ge, SiGe, WSix, TiN, Ta, Ti, and SiC.

Claim 34 (new): The photodetector device of claim 31 including:

a silicide contact to the first electrode and
a silicide contact to the second electrode.

Claim 35 (new): A semiconductor device comprising an array of lateral trench p-i-n photodiodes connected in parallel formed on a semiconductor substrate, comprising:

an array of parallel trenches formed in the substrate comprising alternating wide trenches and narrow trenches;

a plurality of first electrodes with each thereof formed in one of the narrow trenches, each first electrode being composed of a first fill material of a first conductivity type;

a plurality of second electrodes with each thereof formed in one of the wide trenches, each second electrode being composed of a second fill material of an opposite conductivity type;

a first set of outdiffusion regions doped with dopant diffused from a first electrode into a region in the substrate about the periphery of the corresponding narrow trench; and

a second set of outdiffusion regions doped with dopant diffused from a second electrode into a region in the substrate about the periphery of the wide trench about the periphery of the corresponding wide trench.

Serial No.:	10/709,699	Art Unit:	2818
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Claim 36 (new): The device of claim 35 including

a pad layer formed over the substrate aside from the trenches with the pad layer comprising a layer through which light passes;

a first liner is formed on the walls of the narrow trench and the first fill material is deposited within the first liner inside the narrow trench;

a second liner is formed on the walls of the narrowed wide trench and the second fill material is deposited within the second liner inside the narrowed wide trench; and

the liner material is composed of a material selected from a group consisting of silicon nitride, Ge, SiGe, WSix, TiN, Ta, Ti, and SiC.